## CLAIMS

**1.** Rotary machine, such as engine, compressor, pump or the like, comprising

- a stator (33) having an inner cavity (11) with at least an intake port (60) and an exhaust port (70),
- a first rotor (31), arranged movably in said cavity, having at least two bases and at least a peripheral surface,
- a driving shaft (32) extending through said first rotor (31) coaxially therewith,

**characterized in that** within said first rotor (31) there are provided conduits (12), which connect at least two faces of said at least a peripheral surface, **and in that** within said same first rotor (31) there is contained a second rotor (20) that is firmly joined to said driving shaft (32).

**2.** Rotary machine, such as engine, compressor, pump or the like according to claim 1, **characterized in that** said second rotor (20) is attached to said driving shaft (32) eccentrically.

**3.** Rotary machine, such as engine, compressor, pump or the like according to claim 2, **characterized in that** said second rotor (20) comprises at least a lobe (20a) adapted to be received and accommodated in a complementary manner in a plurality of recesses (11a, 11b, 11c), in which said conduits (12) terminate.

**4.** Rotary machine, such as engine, compressor, pump or the like according to claim 3, **characterized in that** said first rotor (31) is a prism, whose bases are delta-shaped and whose cross-section orthogonally to the axis of rotation, in correspondence of said recesses (11a, 11b, 11c), is substantially defined as follows:

- let a first equilateral triangle (T1) be considered along with a second triangle (T2), in which said second triangle is contained in said first triangle with the barycentre thereof coinciding with the barycentre of the latter, as well as with the sides thereof extending parallel to the sides of said first triangle (T1),
- let circumference arcs (L1) be now drawn out between all of the vertices of said first triangle (T1) and externally thereto, with a radius corresponding to the distance to the farthermost vertex of the second triangle (T2),
- let a first, a second and a third semi-circumference (L2) be finally drawn out having the extremities thereof corresponding to the vertices of said second triangle (T2), and extending externally thereto, without said first, second and third semi-circumferences coming ever into contact with said circumference arcs (L1).

**5.** Rotary machine, such as engine, compressor, pump or the like according to claim 4, **characterized in that** the cross-section of said second rotor (20) is defined substantially as follows:

- considering one of said first, second or third semi-circumference (L1), let a fourth and a fifth similar semi-circumferences (Cf1, Cf2) be now drawn out, in such a manner that the diameters of said fourth and fifth semi-circumferences (Cf1, Cf2) may belong to a rectangle that does not intersect said same fourth and fifth semi-circumferences, and in such a manner that between a centre (C1, C2) of said fourth or said fifth semi-circumference and the outermost point on the other semi-circumference there is a distance (M2) corresponding to the height of the second triangle (T2),
- let the extremities of said fourth and fifth semi-circumferences (Cf1, Cf2) be now joined to each other

through equal circumference arcs (Cf3) that have their centre on the axis (M) of the segment (SS) having the centres (C1, C2) of said fourth and fifth semi-circumferences as its extremities, and a radius equal to the height (M2) of the second triangle (T2), in such a manner that the convexity of said equal arcs (Cf3) is so oriented as to face said centres (C1, C2) of said fourth and fifth semi-circumferences (Cf1, Cf2), in which the axis of rotation (X) of said second rotor (20) passes through the centre of one of said fourth and fifth semi-circumferences.

**6.** Rotary machine, such as engine, compressor, pump or the like according to claim 5, **characterized in that** the cross-section of the stator (33) is symmetrical and defined substantially as follows:

- let a first arc of a circumference (A2) be described with the centre thereof at a vertex (P2) of said second triangle (T2) and the radius thereof corresponding to the distance of said vertex (P2) of said second triangle (T2) to a farthermost vertex belonging to said first triangle (T1),

- considering the circle (CC), in which said second triangle (T2) is inscribed, let now the point (P2') be identified, at which said circle (CC) intersects the height (AA) of said first triangle (T1) passing through said vertex (P2) of said second triangle (T2),

- let a second arc (A3) be drawn out having its centre at said intersection point (P2') and a radius corresponding to the distance of said vertex (P2) of said second triangle (T2) to a farthermost vertex belonging to said first triangle (T1),

- let now a third and a fourth arc of a circumference (A4), equal to each other, be drawn out externally to said first triangle (T1), with the centres thereof situated at said vertex (P2) of said second triangle (T2) and said point of intersection (P2'), respectively, and with a radius corresponding to the distance (M1) of said vertex (P2) of said second triangle (T2) to the nearest vertex of said first triangle (T1), so that they intersect said first and said second arc (A2, A3),

- let finally a fifth and a sixth arc of a circumference (A7), equal to each other, be drawn out with the centre thereof on the segment (S1) having the intersections of said first and said second arc (A2, A3) with each other as its extremities, and with a radius corresponding to the distance (M1) of said vertex (P2) of said second triangle (T2) to the nearest vertex of said first triangle (T1), so that said fifth and said sixth arc of a circumference (A7) are tangent to said first and said second arc (A2, A3) at the extremities thereof.

**7.** Engine according to claim 6, **characterized in that** said conduits (12) inside said first rotor (31) are in the shape of a mixtilinear rectangle in their cross-section.

**8.** Engine according to claim 6, **characterized in that** said second rotor (20) comprises internal conduits (20b) for carrying cooling and lubrication media.

**9.** Engine according to claim 6, **characterized in that** between contiguous ones of said recesses (11a, 11b, 11c) of said first rotor (31) there are provided sealing means (13a, 13b, 13c).

**10.** Engine according to claim 6, **characterized in that** along the perimeter of the bases of said first rotor (31) there are provided guides (88) associated to rollers (27) that are attached to the stator (33) and dampened by elastic means.

**11.** Engine according to claim 10, **characterized in that** sealing means are provided along the border of

said guides (88).

**12.** Engine according to claim 6, **characterized in that** sealing means are provided at the corners of the peripheral surface and along the perimeter of the bases of said rotor (31).

**13.** Engine according to claim 6, **characterized in that** at least an injector (39, 23) and/or at least a heater plug (38) and/or at least an igniter plug (38) are debouching at the surface of said inner cavity (11).

**14.** Engine according to claim 6, **characterized in that** a valve (14) is provided in the proximity of the at least one exhaust port (70).

**15.** Compressor according to claim 6, **characterized in that** in the inner cavity (111) of the stator (133) there is provided at least a lubricant inlet port (151a, 151b) situated at a distance from the axis of rotation of the second rotor (120) that is approximately equal to the radius of said fourth or fifth semi-circumference (Cf1, Cf2).

**16.** Compressor according to claim 6, **characterized in that** said at least a lubricant inlet port (151a, 151b) is provided along an axis of symmetry (Y) of the stator (133).

**17.** Compressor according to claim 6, **characterized in that** on said internal conduits (112a, 112b, 112c) in said first rotor (131) there are provided check valve means.

**18.** Compressor according to claim 17, **characterized in that** said check valve means comprise a half-sphere (190) housed in a cavity that is complementary to said half-sphere and provided at the outlet of said conduits (112a, 112b, 112c), in which said half-sphere (190) is retained by an elastic cord (192) surrounding the first rotor (131), and in which said cord is contained in a groove provided in the peripheral surface of said first rotor.

**19.** Compressor according to claim 6, **characterized in that** between the contiguous recesses (111a, 111b, 111c) of said first rotor (131) there are provided sealing means (113a, 113b, 113c).

**20.** Compressor according to any of the claims 1 to 6, **characterized in that** along the perimeter of the bases of said first rotor (131) there are provided guides (188) associated to rollers that are attached to the stator and dampened by elastic means.

**21.** Compressor according to claim 20, **characterized in that** sealing means are provided along the border of said guides (188).

**22.** Compressor according to claim 6, **characterized in that** sealing means (115a, 115b, 115c) are provided at the corners of the peripheral surface and along the perimeter of the bases of said first rotor.

**23.** Compressor according to claim 6, **characterized in that** at least an inlet port (150a, 150b) and a delivery port (105, 125) are debouching at the surface of the inner cavity of said stator (133) for the medium to be compressed.

**24.** Process for pressurizing a medium contained in a chamber through the injection of an incompressible working medium that is chemically inert in respect to said first medium.

**25.** Process according to claim 24, in which use is made of the compressor (100) according to claims 15 to 23.

**26.** Process according to claim 25, **characterized in that** said working medium is a lubricant.

**27.** Process according to claim 25, **characterized in that** said medium is a coolant.

**28.** Process according to claim 25, **characterized in that** it is the rotation of said second rotor (120) that causes said working medium to be injected.

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